



# UNITED STATES PATENT AND TRADEMARK OFFICE

UNITED STATES DEPARTMENT OF COMMERCE  
United States Patent and Trademark Office  
Address: COMMISSIONER FOR PATENTS  
P.O. Box 1450  
Alexandria, Virginia 22313-1450  
www.uspto.gov

APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/055,487	10/29/2001	Robert Burgess	10015534	7488

7590 05/28/2004  
HEWLETT-PACKARD COMPANY  
Intellectual Property Administration  
P.O. Box 272400  
Fort Collins, CO 80527-2400

EXAMINER

RUGGLES, JOHN S

ART UNIT	PAPER NUMBER
----------	--------------

1756

DATE MAILED: 05/28/2004

Please find below and/or attached an Office communication concerning this application or proceeding.

# Office Action Summary

Application No.

10/055,487

Applicant(s)

BURGESS, ROBERT

Examiner

John Ruggles

Art Unit

1756

— The MAILING DATE of this communication appears on the cover sheet with the correspondence address —  
Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM  
THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

## Status

- 1) ☒ Responsive to communication(s) filed on 12 April 2004.
- 2a) ☐ This action is FINAL. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

## Disposition of Claims

- 4) ☒ Claim(s) 1-56 is/are pending in the application.
- 4a) Of the above claim(s) 8-21, 24, 46 and 47 is/are withdrawn from consideration.
- 5) ☒ Claim(s) 36, 48-53, 55 and 56 is/are allowed.
- 6) ☒ Claim(s) 1-7, 22, 23, 25-28, 31-35, 37-45 and 54 is/are rejected.
- 7) ☒ Claim(s) 29 and 30 is/are objected to.
- 8) ☐ Claim(s) \_\_\_\_\_ are subject to restriction and/or election requirement.

## Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on \_\_\_\_\_ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.  
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).  
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

## Priority under 35 U.S.C. § 119

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).  
a) ☐ All b) ☐ Some \* c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
  2. ☐ Certified copies of the priority documents have been received in Application No. \_\_\_\_\_.
  3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

\* See the attached detailed Office action for a list of the certified copies not received.

## Attachment(s)

- 1) ☐ Notice of References Cited (PTO-892)
- 2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
- 3) ☐ Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08)  
Paper No(s)/Mail Date \_\_\_\_\_.
- 4) ☐ Interview Summary (PTO-413)  
Paper No(s)/Mail Date \_\_\_\_\_.
- 5) ☐ Notice of Informal Patent Application (PTO-152)
- 6) ☐ Other: \_\_\_\_\_.

**DETAILED ACTION*****Continued Examination Under 37 CFR 1.114***

A request for continued examination under 37 CFR 1.114, including the fee set forth in 37 CFR 1.17(e), was filed in this application after final rejection. Since this application is eligible for continued examination under 37 CFR 1.114, and the fee set forth in 37 CFR 1.17(e) has been timely paid, the finality of the previous Office action has been withdrawn pursuant to 37 CFR 1.114. Applicant's submission filed on 12 April 2004 has been entered.

***Response to Amendment***

Claims 1 and 35 have been currently amended, claims 8-21 and 24 were previously withdrawn as non-elected, claims 46-47 have also been withdrawn, and new claims 48-56 have been added. Therefore, only claims 1-7, 22-23, 25-45, and 48-56 remain under consideration.

***Claim Rejections - 35 USC § 112***

The following is a quotation of the first paragraph of 35 U.S.C. 112:

The specification shall contain a written description of the invention, and of the manner and process of making and using it, in such full, clear, concise, and exact terms as to enable any person skilled in the art to which it pertains, or with which it is most nearly connected, to make and use the same and shall set forth the best mode contemplated by the inventor of carrying out his invention.

Claims 35 and 37-45 are rejected under 35 U.S.C. 112, first paragraph, as failing to comply with the written description requirement. The claim(s) contain subject matter, which was not described in the specification in such a way as to reasonably convey to one skilled in the relevant art that the inventor(s), at the time the application was filed, had possession of the

Art Unit: 1756

claimed invention. Claim 35 has been currently amended to include the phrase "wherein said modified inkjet print cartridge is modified to contain said light-emitting centers and no longer contains nor dispenses ink". Instant page 11, lines 1-4 describe modifying an ink jet print cartridge to have light emitting centers fabricated at the locations of the firing resistors of the ink jet print heads on the ink jet cartridges. However, this description does not support the phrase "...and no longer contains nor dispenses ink" found in claim 35, on which claims 37-45 depend. This constitutes new matter. Applicant must either strike this new matter from claim 35 or show specific support for this phrase in the original specification.

The following is a quotation of the second paragraph of 35 U.S.C. 112:

The specification shall conclude with one or more claims particularly pointing out and distinctly claiming the subject matter, which the applicant regards as his invention.

Claim 54 recites the limitation "said transport system", which lacks antecedent basis.

### ***Claim Rejections - 35 USC § 103***

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

Claims 1-5 and 22 are rejected under 35 U.S.C. 103(a) as being unpatentable over Batchelder, et al. (US Patent 5,303,141), especially in view of Lawton (US Patent 5,980,812).

Art Unit: 1756

Batchelder describes a process and apparatus for fabricating a three-dimensional solid object by extrusion of light or heat curable building material through a scanning extrusion nozzle orifice as an applicator (e.g., for spraying, etc.) to build up successive layers as shown in Figures 1A and 2A and described at column 4, lines 37-65 and column 5, line 59 to column 6, line 6. Column 6, lines 25-28 describe alternative use of a nozzle applicator having three or more degrees of movement, which may make movement of the building material support table 16 unnecessary (encompassing the raising of the applicator nozzle with each successive layer of deposited building material of instant claim 22). In the case of composite structures composed of a number of sub-structures, each sub-structure is selectively made from the material appropriate to the function of that sub-structure. A multi-nozzle system can be employed to build composite structures (column 6, lines 56-61). Curing of the building material is initiated as it is extruded from each scanning nozzle orifice by coupling a laser or radiant lamp having an associated focusing reflector (baffle) to the scanning nozzle (column 7, lines 12-22). The deposited building material is imaged by a plurality of laser diodes to generate a sheet of light having a thickness corresponding to that of the deposited bead of building material and a width corresponding to the width of the imaging objective (even though described for use in visual image feedback sensing, this combination is also understood to be useful for the laser light curing means having associated light focusing reflectors, baffles, or lenses coupled to each scanning nozzle in which the laser light sources are laser diode light-emitting centers (e.g., LED's, etc.), column 9, lines 57-66). Rules for placement of each deposited layer formed from extruded and cured building material can ensure maximum smoothness of each layer before deposition of the next successive layer (column 13, lines 31-51).

While meeting other limitations of instant claims 1-2, 5, and 22, Batchelder does not specifically require depositing uniform layers of building material (instant claims 1-2, 5, and 22) using a printing cartridge that includes an orifice plate (instant claims 3-4). However, it would still have been obvious to one of ordinary skill in the art at the time the invention was made to have used uniform layers of building material, because Batchelder provides rules for ensuring maximum smoothness of each layer of building material before deposition of the next successive layer thereof (instant claims 1-2, 5, and 22).

Lawton shows a process for fabricating a three-dimensional solid object by building up layers formed by ink jet or powder jet technology and subsequent selective laser diode scanned imaging to cure the building material (column 10, lines 41-42 and column 16, line 32). Ink jet technology encompasses ink jet printing using a printing cartridge that includes an orifice plate for selectively spraying the building material. Alternatively, the building material 105 can be evenly spread or made uniform by sliding a doctor blade 104 having edge 104' over deposited building material 106, before scanned imaging by beam 107 to selectively cure areas 108 of uniform layer 106 (see Figure 1 as described at column 6, line 52 to column 7, line 20).

It would especially have been obvious to one of ordinary skill in the art at the time the invention was made to form uniform layers of building material by using a printing cartridge having an orifice plate such as found in ink jet printers to apply or spray the building material followed by smoothing with a sliding doctor blade to form a uniform layer of building material as shown by Lawton; the printing cartridge being modified to include laser diodes and associated focusing lenses at nozzle locations set at predetermined distances from the laser diodes to focus light on the applied building material for curing, as suggested by Batchelder (instant claims 3-4).

Art Unit: 1756

This is because Batchelder and Lawton relate to the same art of coating and selective curing of successive smooth or uniform layers of building material and because Lawton further shows use of a sliding doctor blade to ensure smooth uniformity of each successive layer of building material before selective curing thereof (instant claims 1-5 and 22).

Claims 6-7 and 23 are rejected under 35 U.S.C. 103(a) as being unpatentable over Batchelder especially in view of Lawton and further in view of Gelbart (US Patent 6,214,276).

While describing fabrication of a solid article by photocuring successive uniform layers of building material using a moving nozzle orifice with coupled laser diodes and focusing lenses, Batchelder and Lawton do not specify additional steps of curing the article (apart from initial curing to solidify each layer) and rinsing non-polymerized building material from the article.

Gelbart teaches a method of fabricating three-dimensional objects using plural laser diodes for selective curing by polymerization of a liquid precursor building material, layer-by-layer. The initial curing of successive layers to solidify the building material is sometimes followed by baking or UV exposure for further curing and washing to remove uncured, non-polymerized building material (column 4, line 53 to column 5, line 35).

It would have been obvious to one of ordinary skill in the art at the time the invention was made to follow the layered building process as taught by Batchelder and Lawton with additional post-building steps of further curing to harden the solid portions and washing or rinsing to remove non-polymerized building material from the article, as taught by Gelbart. This is because Batchelder, Lawton, and Gelbart all relate to the same art of coating and selective curing of successive layers of building material to form a three-dimensional solid object.

Claims 25-28 and 31-34 are rejected under 35 U.S.C. 103(a) as being unpatentable over Batchelder especially in view of Lawton, further in view of Gelbart, further in view of Lin (US Patent 5,764,263), and further in view of Mercer (US Patent 4,029,006).

While describing fabrication of a solid article by photocuring successive uniform layers of building material using a moving nozzle orifice with coupled laser diodes and focusing lenses followed by subsequent additional baking or curing and washing or rinsing to remove uncured building material, Batchelder, Lawton, and Gelbart do not specifically teach automatic transport of the photocured building material to a separate curing unit.

Lin discloses an ink jet printing process and apparatus for reducing curl of a coated substrate (understood to include enhancement of flatness, smoothness, and uniformity of the coated substrate) by coating of single or plural layers (title and abstract). The ink jet printing is preferably carried out with one or more thermal ink print heads 22, 24, 27, and/or 29 (each understood to have one or more nozzle orifices for ejection of ink heated by firing resistors, which are driven by control circuitry) for selective spraying of coating material onto the substrate (Figure 2 and column 6, lines 56-64). Other suitable types of printing include using a pen plotter, continuous stream ink jet printing, drop-on-demand ink jet printing (e.g., piezoelectric, acoustic, etc. types). Heat may be applied to the substrate  $S_d$  at any location, including before, during, and after application of coating material. Heaters 25, 30, 31, 32, 33, and 34 can be any type of conventional heating means (e.g., lamps, laser diodes, etc.). Figure 2 shows transport of the substrate using advancing device 35, which may include rotating rollers, wheels, transporting device(s) for a belt or platen, and/or guiding gears (column 11, lines 13-46). This advancing



Art Unit: 1756

device is interpreted to be programmable or automated, being operated in concert with the ink jet print heads and separate heaters in order to achieve desired patterns of cured coating material on the substrate.

Automated control of the transport means for controlled coordination with an ink jet printing head has been known in the art of ink jet printing for some time, as shown by Mercer (abstract, Figure 1, and column 4, lines 35-51).

It would have been obvious to one of ordinary skill in the art at the time the invention was made to have used an automatic transport between various process stations (including coating, imaging, heating, curing, and rinsing) coordinated with movement of the applicator (ink jet printing head) disclosed by Lin and Mercer in the process of Batchelder, Lawton, and Gelbart. This is because Batchelder, Lawton, and Gelbart all relate to the same art of coating and selective curing of successive layers of building material to form a three-dimensional solid object and also because Lawton, Lin, and Mercer all relate to the same art of coating by ink jet printing.

The previous rejections of claims 35 and 37-45 under 35 U.S.C. 103(a) are overcome by the current amendment of claim 35, on which claims 37-45 depend. However, this amendment of claim 35 has also introduced new matter, which necessitated the new rejection of these claims under the first paragraph of 35 U.S.C. 112, as set forth above.

Art Unit: 1756

*Allowable Subject Matter*

Claims 29-30 are objected to as being dependent upon a rejected base claim, but would be allowable if rewritten in independent form including all of the limitations of the base claim and any intervening claims.

The following is a statement of reasons for the indication of allowable subject matter: claim 29, on which claim 30 depends, specifies using a modified ink jet printing cartridge that includes light directing devices located *in* an orifice plate (emphasis added). This combination is not specifically shown by the cited prior art.

Claims 36, 48-53, and 55-56 are allowed.

Claim 54 would also be allowable if rewritten to overcome the rejection(s) under 35 U.S.C. 112, second paragraph, set forth in this Office action and to include all of the limitations of the base claim and any intervening claims.

As allowable subject matter has been indicated, applicant's reply must either comply with all formal requirements or specifically traverse each requirement not complied with. See 37 CFR 1.111(b) and MPEP § 707.07(a).

The statement of reasons for the indication of allowable subject matter set forth in the previous Office action mailed on 18 December 2003 in regard to claim 36 now also applies to dependent claims 48-56.

*Response to Arguments*

On pages 16-17 of the amendment filed on 12 April 2004, the Applicant has traversed the withdrawal of apparatus claims 46-47 as being drawn to a non-elected invention. However,

Art Unit: 1756

Applicant had already previously elected Group I claims 1-7 and 22-23 drawn a method of fabrication (process) *without* traverse, leaving all product and apparatus claims withdrawn as non-elected. Still, Applicant has argued that the subsequently added apparatus claims 46-47 are part of the same group as the previously elected method claims, stating that these apparatus claims are drawn to systems for performing the processes of claims 1 and 26, respectively; and further asserting that claims 46-47 are linking claims. Yet, this argument is still not persuasive. First, the process of claim 1 could be practiced by another and materially different apparatus than that of claim 46, such as a modified ink jet printer. Similarly, the apparatus of claim 47 could be used to practice another and materially different process than that of claim 26, such as a fabrication process involving rinsing. Thus, these inventions are distinct and restriction for purposes of examination is proper. Second, MPEP § 806.05(e) states, in part, "It should be noted that a claim such as, 'An apparatus for the practice of the process of claim 1, comprising...' and then the claim continues with purely apparatus limitations, is *not* a linking claim." (Emphasis added). Therefore, claims 46-47 are not linking claims as asserted by Applicant and the previous election of the method claims without traverse is still binding.

In response to Applicant's argument on pages 18-19 against the combination of Batchelder and Lawton, the test for obviousness is not whether the features of a secondary reference may be bodily incorporated into the structure of the primary reference; nor is it that the claimed invention must be expressly suggested in any one or all of the references. Rather, the test is what the combined teachings of the references would have suggested to those of ordinary skill in the art. See *In re Keller*, 642 F.2d 413, 208 USPQ 871 (CCPA 1981). In this case, one of ordinary skill in the art would have recognized that while Batchelder used immediate laser

Art Unit: 1756

curing at deposition of a first building material to prevent deformation, the need for immediate curing was obviated by Lawton's approach using a second building material deposited by either ink jet coating or built up from a bath of building material selectively cured with a scanned laser diode. Both Batchelder and Lawton used selective laser curing of built up layers to form three-dimensional solid objects.

In response to applicant's argument that there is no suggestion to combine the references, the examiner recognizes that obviousness can only be established by combining or modifying the teachings of the prior art to produce the claimed invention where there is some teaching, suggestion, or motivation to do so found either in the references themselves or in the knowledge generally available to one of ordinary skill in the art. See *In re Fine*, 837 F.2d 1071, 5 USPQ2d 1596 (Fed. Cir. 1988) and *In re Jones*, 958 F.2d 347, 21 USPQ2d 1941 (Fed. Cir. 1992). In this case, the reasons for combining Batchelder and Lawton were previously set forth and are repeated above.

In response to applicant's arguments against the references individually, one cannot show nonobviousness by attacking references individually where the rejections are based on combinations of references. See *In re Keller*, 642 F.2d 413, 208 USPQ 871 (CCPA 1981); *In re Merck & Co.*, 800 F.2d 1091, 231 USPQ 375 (Fed. Cir. 1986).

On page 20, Applicant asserts that neither Batchelder nor Lawton raises the applicator used to lay down building material. However, Batchelder has expressly stated the intention to not only raise the applicator during deposition of each layer of building material, but also describes alternative use of an applicator nozzle having three or more degrees of movement (column 6, lines 25-28). Likewise, Lawton's ink jet applicator could have been raised for each

Art Unit: 1756

additional layer as an alternative to lowering of the support table. Besides, Applicant has already admitted that raising the applicator incrementally upward after application of each layer was already known in the art at the time of the invention (instant page 4, lines 22-24).

Applicant alleges on page 21 that the combination of Batchelder and Lawton fails to teach or even suggest scanning a layer of building material with a plurality of light-emitting centers. As discussed above, Batchelder teaches use of plural nozzle applicators for laying down building material with each nozzle having associated imaging laser diodes (which are understood to be useful for the laser light curing means and therefore read on a plurality of light-emitting centers). Lawton provides the laser scanning aspect for selective curing of each layer of previously applied building material to form a three-dimensional solid object. Therefore, one of ordinary skill in the art would understand the combination of Batchelder and Lawton to suggest scanning a layer of building material with a plurality of light-emitting centers.

On page 22, Applicant argues that neither Lin nor any other reference of record teaches or suggests using a transport system between an applicator and a curing oven in a system for fabricating an article. However, Applicant acknowledges that transport systems like that of Lin are known in various arts. Also, Lawton specifies the utility of ink jet printing for application of building material for building up three dimensional solid objects while Lin and Mercer show the use of automated transport between an ink jet applicator and one or more separate heating or curing sections (e.g., lamps, laser diodes, etc.). These curing sections are equivalent to curing ovens and the automated transport is equivalent to that of the instant invention.

In regard to the argument on page 23 that Lin alone does not teach or suggest inclusion of a rinsing unit, Applicant is reminded that Lin was not relied upon to show rinsing. Rather,

Art Unit: 1756

Gelbart was cited to show the rinsing aspect in combination with the process teachings of Batchelder, Lawton, Lin, and Mercer. In this combination, it would have been obvious to expand the automatic transport between various process stations of coating, imaging, heating, and curing to also include rinsing for the reasons shown by Gelbart.

Applicant's arguments on pages 23-25 with respect to claims 35 and 37-45 have been considered but are moot in view of the new ground(s) of rejection.

The previous rejections of claims 35 and 37-45 under 35 U.S.C. 103(a) have been overcome by the current amendment of claim 35, on which claims 37-45 depend. However, this amendment of claim 35 has also introduced new matter, which necessitated the new rejection of these claims under the first paragraph of 35 U.S.C. 112, as set forth above.

Applicant's addition of new claim 54 has also necessitated a new formal rejection under the second paragraph of 35 U.S.C. 112.

Allowable subject matter has been indicated in claim 54, but applicant must still address all remaining formal requirements as noted above.

Claims 36, 48-53, and 55-56 have now been allowed.

Regarding the arguments on pages 25-26, claims 3-5 are still believed to be obvious variations over the cited prior art combination of Batchelder and Lawton, for the same reasons previously set forth and again pointed out above. Applicant is reminded that Lawton alternatively suggests application of the building material with an ink jet printer, while Batchelder teaches location of laser light emitting centers at applicator nozzles; the combination of which renders these claims obvious.

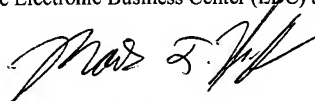
In view of Applicant's further remarks on pages 25-26, claims 29-30 have now been objected to as being dependent upon a rejected base claim, but would be allowable if rewritten in independent form including all of the limitations of the base claim and any intervening claims. While Seki's Figure 24 carriage CA has both ink jet printing orifices OF1-OF8 on one side and LED's LE1-LE4 on the other side, this embodiment does not specifically show the LED's *in* the ink jet printing orifices.

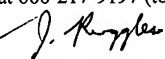
### *Conclusion*

Any inquiry concerning this communication or earlier communications from the examiner should be directed to John Ruggles whose telephone number is 571-272-1390. The examiner can normally be reached on Monday-Thursday and alternate Fridays.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Mark Huff can be reached on 571-272-1385. The fax phone number for the organization where this application or proceeding is assigned is 703-872-9306.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).

  
MARK F. HUFF  
SUPERVISORY PATENT EXAMINER  
TECHNOLOGY CENTER 1700

  
John Ruggles  
Examiner  
Art Unit 1756